

# Improving Stream Habitat and Protecting Roads



Hoh 2 CED Construction, August 2014  
Bank Stabilization Using Contiguous Log Revetment With Deflector Structures

## WSDOT CED Program Fiscal Year 2015 Report

Environmental Services Office

April, 2016



Washington State Department of Transportation  
Environmental and Engineering Service Center  
Environmental Services Office

**Improving Stream Habitat and Protecting Roads  
WSDOT CED Program Fiscal Year 2015 Report**

CED Coordinator: Tim Hilliard  
Box 47331  
Olympia WA 98504-7331  
360-705-7488  
[hilliat@wsdot.wa.gov](mailto:hilliat@wsdot.wa.gov)

<http://www.wsdot.wa.gov/Environment/Biology/FP/CEDretrofits.htm>

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## **Abbreviations and Acronyms**

CED – Chronic Environmental Deficiency

ER – Eastern Region

FY – Fiscal Year

NCR – North Central Region

NWR – Northwest Region

OR – Olympic Region

SCR – South Central Region

SRA – Site and Reach Assessment

SW – Southwest Region

WDFW – Washington State Department of Fish and Wildlife

WSDOT – Washington State Department of Transportation

# **Improving Stream Habitat and Protecting Roads WSDOT CED Program Fiscal Year 2015 Report**

## **Introduction**

### ***Annual Reports***

This report summarizes the Washington State Department of Transportation's (WSDOT) Chronic Environmental Deficiencies (CED) program and program accomplishments for Fiscal Year (FY) 2015 (July 2014 to June 2015). We discuss active CED projects; other CED sites that are planned, analyzed, and funded for future construction; and nominated sites. For older projects, you may find more information in the reports from other years, available online at the link below, or by request. Also, of course, the staff are always happy to discuss the program with you (see contact information inside cover).

<http://www.wsdot.wa.gov/Environment/Biology/FP/CEDretrofits.htm>

### ***The CED Program***

When roads are located along rivers they are often subject to periodic damage from seasonal high flows and severe storms. The traditional maintenance or emergency response is to protect the roadway with rock armoring to stabilize eroding banks and fend off the water's force. This work may only address a symptom and so require frequent repetition. Threats to the roadway and risk of road closures may continue.

The design of the historical road system often ignored ecological and fluvial processes. While new projects do account for these processes, sometimes older projects require re-design to avoid chronic maintenance repairs that impact aquatic systems.

The traditional approach may also result in significant loss of aquatic habitat in the ongoing cycle of damage and repair. Severe weather, high flows and flooding exhibit increasing frequency and intensity in Washington State and elsewhere.

WSDOT, with the Washington Department of Fish and Wildlife (WDFW), established the CED program in 2001 to reduce the effect of repetitive maintenance activities on the aquatic environment and to find long-term solutions that optimize improvements for fish and fish habitat while addressing transportation needs.

The goal of the CED program is to:

- Reduce maintenance costs.
- Reduce societal impacts of road closures.
- Reduce or remove material that is or could be damaging to aquatic habitat.
- Protect infrastructure with rough woody structures and other bioengineered designs to enhance fish habitat.

A CED site is a location adjacent to the state highway system where recent, frequent, and chronic maintenance of the state transportation system is causing impacts to fish and fish habitat.

The CED program has set the following criteria for projects to be entered into the program. Adjustments may be made as projects get funded and constructed:

- Adverse habitat conditions related to fish or fish habitat are associated with repetitive repairs to WSDOT infrastructure.

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- The infrastructure at the site has a history of maintenance actions, usually including at least three repairs and/or maintenance activities within the last 10 years.
- The project does not fit into another WSDOT funding category.

Often, to protect the road from damage due to river processes, bank stabilization is needed. The traditional response is to use rip rap armoring to stabilize the bank. However, this may result in damage to or loss of habitat. WSDOT is focusing on habitat-enhancing bank stabilization methods. Many different techniques may be applied on a site-specific basis. One of these techniques is engineered logjams (ELJs). ELJs have been constructed as both bank stabilization and as mid-channel flow diffusion structures (Hoh, Nooksack and Clallam Rivers). Mid-channel flow diffusion structures take the pressure of the flows off of the bank that is being damaged. Other projects in the CED program have replaced bridges to allow channel migration (Nolan Creek), or placed buried woody groins (Snoqualmie), which can be constructed out of the water and work to protect the bank from the rivers advance toward the highway.

The first Hoh River project, completed in FY 2006, is WSDOT's largest completed CED to date, and includes the world's largest known ELJs. WSDOT staff is currently monitoring the use of habitat in the Hoh River project and comparing that with another failing site, a rip rapped bank just upstream. WSDOT is now looking at a small area of renewed erosion on the ten-year old site. The comparison site, known as Hoh 2, is also a CED site and was completed this fiscal year. There is also a discussion of Hoh 2 in the Highlighted Projects section later in this report.

The Skagit River Engineered Log Jam project, completed in FY 2014, is another huge project that garnered much attention. Completed using a modular design with logs and dolos, it is thought to be the largest use of dolos in fresh water in the world. Some updates on this project are included in the Highlighted Projects section of this report.

### ***Initial Identification of CED Sites***

WSDOT and WDFW work together following a process specified in a Memorandum of Agreement established between WDFW and WSDOT (Washington State Department of Fish and Wildlife and Washington State Department of Transportation, 2008). Potential CEDs can be nominated by WSDOT, WDFW, Tribes or other concerned parties. Nominations come to the CED coordinator who works with WSDOT regional staff to identify possible CED projects. Nominations are screened to determine if the site meets the program's criteria with an initial site visit. The following people are involved in the initial site assessment and determine the eligibility:

- CED coordinator.
- CED technical lead.
- Region Maintenance Environmental Coordinator.
- Maintenance staff.
- Other persons familiar with the site.

### ***Site and Reach Analysis***

Reach analysis (Figure 1) is at the core of the CED project development process. A stream reach assessment or analysis is conducted for each CED project site. These assessments can

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vary in scope and form. A corridor analysis addresses a larger scope and often analyzes multiple sites along the highway river interface. The SRA report gives a “best available science” approach to a solution. With input from WDFW, WSDOT identifies multiple alternatives and selects a recommended alternative.

The SRA addresses key habitat and road features and describes contributing factors related to landscape, land use, and infrastructure that led to the identified chronic deficiencies, and presents an evaluation of corrective treatment alternatives. The general approach used is similar to the Level 1 geomorphic assessment described in Hydraulic Engineering Circular (HEC) 20 3rd edition (Lagasse et al, 2012) as well as to the methods specified in in chapters 2-5 of the Integrated Streambank Protection Guidelines (WDFW 2002).



**Figure 1. Hydrologists in the field at Dry Creek, SR 97, Central Region.**

SRAs are primarily a tool for identifying the factors causing the problem and to develop conceptual solutions. It is neither a “cook-book” approach to solving CED problems, nor a substitute for design. It is anticipated that this approach will result in a project proposal that meets or exceeds applicable standards and other requirements for protecting public safety, preserving transportation infrastructure, and will gain regulatory approval from resource agencies.

As SRAs are completed, they go through an internal WSDOT hydrology technical review, and are then reviewed by WSDOT region and engineers and area habitat biologists from WDFW. At the completion of WDFW review, which takes approximately a month, a meeting may be held to verify the intent of the recommended alternative and work out

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any technical concerns. Completed reach assessments for most CED sites are available from CED staff.

### ***Concurrence Process***

At the conclusion of the SRA, a concurrence meeting may be held, either stand-alone or in combination with an early permit coordination meeting. Typically, in addition to CED staff, the attendees are an engineer and an area habitat biologist from WDFW; an engineer, a hydrologist, and a maintenance staff person from WSDOT; and other interested parties, especially from regulatory agencies. Here, the recommended alternative is discussed and WSDOT scoping engineers become familiar with the project. The concurrence meeting usually involves a presentation by the project's lead hydrologist, who describes the SRA and explains the recommended alternative. The CED coordinator facilitates the meeting and makes sure that experts on permitting, constructability, and feasibility are included as needed. Following the presentation attendees conduct a field review of the site to address constructability questions, environmental permitting, habitat features, and other feasibility questions. When the parties agree, a concurrence form is signed, and their conclusions are relayed to the scoping engineer to derive a cost estimate.

### ***Prioritization***

In 2005, a prioritization methodology was created to provide a scientifically-based priority to the order of CED correction (Sekulich, 2005). This prioritization allows WSDOT to submit a list of statewide prioritized projects to the Legislature. This process establishes a scientifically based priority index score (PI), allowing comparison with other proposed projects. The score is based on many factors related to amount of habitat protected, species present, transportation needs, and estimated cost ranges.

Multiple sites located along a highway corridor may be prioritized together using aggregated PI scores. This allows WSDOT to show cumulative benefits to addressing multiple projects in one area. This aggregate priority is established during the design phase, with major considerations being constructability and feasibility.

The prioritized and scoped projects are used as the basis to build a funding package and establish a request for project funds. WSDOT requests funding from the State Legislature on a project-specific, biennial basis. Funds from WSDOT's Highway Construction Improvement (I-4) Program are used to construct CED projects on state highways. Twenty-two projects have been completed with funding coming from the State Legislature within the CED program and in some cases from other sources including The Federal Highway Administration.

### ***Funding***

CED projects are funded through several different sources. These can include dedicated stand-alone projects using project funds from WSDOT's Highway Construction Improvement Program (I-4), existing road project funds, emergency funds, and partnerships with Tribes, non-profits, counties, etc. If the CED project is not part of a larger project, the CED program staff orchestrates scoping the recommended alternative. Once scoped, a request for funding is put forward to the legislature under Improvement - Environmental Retrofit to address the deficiency as a standalone project.



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By the end of FY 2015, 30 projects were completed, and five are funded for design and/or construction (through CED or other funding program). A total of 146 sites have been nominated for CED analysis over the life of the program.

As mentioned above, some CED projects are funded under emergency situations. In these cases, collaboration with WDFW and the work that has been completed toward a site and reach analysis sets the stage to receive Federal funding. An SRA benefits WSDOT by outlining the problems, risks, and potential solutions at that site and in the project reach. This document can be used to support the justification for an emergency action and to protect habitat in the occurrence of an emergency or imminent threat. Also, the SRA is sometimes valuable in showing the need for a “betterment” using federal emergency funding.

WSDOT has many other stand-alone funding sources, some of which have requirements that are similar to those in the CED program. Funding for the Unstable Slopes Program is based on geotechnical issues such as slope stability. Funding for the Fish Passage Program is based in part on the ability for fish to navigate through WSDOT infrastructure. These programs are examples of other areas where projects may be funded if they do not meet CED criteria.

### ***Design***

When the chosen alternative identified in the SRA is funded, the project is assigned to a project office. The CED coordinator coordinates with the project office to discuss the CED goals and objectives and make sure the project office has the support it needs. Often, the lead hydrologist for the SRA will be a member of the design team. WDFW is involved throughout the process with design review. Once the conceptual design is agreed on by resource agencies, appropriate permits are obtained.

### ***Construction***

During construction the CED program staff verifies that the CED goals and design criteria are being met and provides technical assistance as needed.

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### CED Projects

The CED program is a statewide program. Sites are identified by regional personnel and others. The CED coordinator and technical staff inventory the sites and enter them into the CED process. Once a project is funded, the project specifics go back to the region where it is fully designed and constructed.

Table 1 summarizes CED projects by their status and by WSDOT region, while Table 2 shows individual nominated CED projects and their status at the end of FY 2015. Table 3 explains the status codes. Status refers to current status at the end of the fiscal year. Figure 2 shows distribution of CED sites across the state.

**Table 1. Number of CED projects and status by WSDOT region, end of FY 2015.**

Status	Eastern	No. Central	North-west	Olympic	So. Central	South-west	Total
Nominated	1	3	11	9	6	5	35
Under Analysis			5			2	7
Assessed		3	7	4	1	1	16
Monitor			1	2	1	3	7
Ongoing CED		1	6	8	7	5	27
Concurred					1	2	3
Scoped		1	1	2		2	6
Funded			4	3	2		9
Constructed	1	2	14	6	4	4	31
Re-opened		1	1	1		2	5
Total	2	11	50	35	22	26	146

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**Table 2. List of CED projects, end of FY 2015.**

<b>Project</b>	<b>Status</b>	<b>Region</b>	<b>State Route</b>	<b>MP</b>
Skykomish River Gorman Property	Ongoing CED	NWR	2	39.70
Skykomish River	Under Analysis	NWR	2	46.00
Skinney Creek	Assessed	NCR	2	88.00
Chiwaukum Creek	Scoped	NCR	2	89.96
Wenatchee River (Tumwater Canyon)	Re-opened	NCR	2	97.00
Wenatchee River near Cashmere	Nominated	NCR	2	116.30
Chico Creek	Ongoing CED	OR	3	40.95
Campbell Creek	Nominated	SWR	4	10.46
Tilton River (site #2)	Under Analysis	SWR	7	4.75
MF Wildcat Creek	Funded	OR	8	5.01
Kennedy Creek	Ongoing CED	OR	8	15.30
Lower Dry Creek	Ongoing CED	SCR	10	104.26
Vance Creek	Nominated	OR	12	19.00
Chehalis River	Nominated	OR	12	27.71
Moon Creek	Nominated	OR	12	37.20
Rainey Creek	Ongoing CED	SWR	12	108.11
EF Stiltner Creek	Ongoing CED	SWR	12	109.30
Cowlitz River	Concurred	SWR	12	118.32
Davis Creek	Ongoing CED	SWR	12	121.00
Naches River (410/12 Y)	Ongoing CED	SCR	12	185.31
Naches River (site #2)	Ongoing CED	SCR	12	192.00
Naches River (site #1)	Constructed	SCR	12	201.30
Pataha Creek	Nominated	SCR	12	383.31
Weeping Hillside	Nominated	SCR	14	154.00
McCormick Creek	Nominated	OR	16	15.00

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<b>Project</b>	<b>Status</b>	<b>Region</b>	<b>State Route</b>	<b>MP</b>
Soosette Creek	Under Analysis	NWR	18	8.90
Snow Creek	Assessed	OR	20	0.07
Childs Creek	Ongoing CED	NWR	20	72.80
Red Cabin Creek	Constructed	NWR	20	75.80
Sutter Creek	Nominated	NWR	20	99.90
Skagit River	Constructed	NWR	20	100.70
Bacon Creek	Funded	NWR	20	110.77
Little Boulder	Assessed	NCR	20	181.38
Goat Creek Springs	Assessed	NCR	20	184.34
Bonaparte Creek	Constructed	NCR	20	278.00
South Nanamkin Creek	Constructed	ER	21	133.60
Yakima River (Toppenish Bridge)	Assessed	SCR	22	1.10
Sand Hollow Wasteway	Constructed	NCR	26	1.30
Yakima River (site #4) @ Zillah	Nominated	SCR	82	53.00
EF Issaquah Creek 21.3	Ongoing CED	NWR	90	21.30
EF Issaquah Creek 22.5	Nominated	NWR	90	22.50
Snoqualmie River (Tinkham)	Monitor	SCR	90	45.00
Gold Creek	Constructed	SCR	90	55.50
Yakima River (Thorp to Irene Rinehart)	Ongoing CED	SCR	90	105.00
Wilson Creek	Nominated	SCR	90	109.14
Pilchuck River CED (Bess Prop)	Funded	NWR	92	5.00
Carl Creek	Monitor	SWR	97	17.20
Satus Creek	Funded	SCR	97	45.80
Dry Creek	Nominated	SCR	97	58.00
Dry Creek Ellensburg	Funded	SCR	97	137.90
Upper Dry Creek	Nominated	SCR	97	143.50
Peshastin Creek	Ongoing CED	NCR	97	181.90
Willapa River	Concurred	SWR	101	54.50
Milbourn Creek	Ongoing	OR	101	130.0

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<b>Project</b>	<b>Status</b>	<b>Region</b>	<b>State Route</b>	<b>MP</b>
	CED			0
Dry Creek	Monitor	OR	101	130.7 0
Nolan Creek	Constructed	OR	101	170.5 0
Hoh River (site #1)	Constructed	OR	101	174.4 0
Hoh 1 Follow-up	Re-opened	OR	101	174.4 0
Old Joe Slough	Scoped	OR	101	174.6 1
Hoh River (site #2)	Funded	OR	101	175.8 0
US 101 McDonald Creek	Constructed	OR	101	258.2 1
Matriotti Creek	Funded	OR	101	260.9 3
Contractors Creek	Ongoing CED	OR	101	278.0 0
Dosewallips River	Assessed	OR	101	306.6 0
Beach Nourishment MP 320-333	Ongoing CED	OR	101	320.0 0
Sund Creek	Ongoing CED	OR	101	329.0 8
Miller Creek	Ongoing CED	OR	101	329.9 3
Norris Slough	Constructed	SWR	105	16.55
Washaway Beach	Re-opened	SWR	105	20.10
SR 106 Washouts 1 to 5	Constructed	OR	106	10.00
Twanoh Creek	Ongoing CED	OR	106	12.30
Twanoh Falls Creek	Constructed	OR	106	13.50
Slide Creek	Monitor	OR	108	6.00
McDonald Creek	Nominated	OR	108	8.90
Moclips River	Assessed	OR	109	31.50
Strait of Juan de Fuca	Nominated	OR	112	5.00
Clallam River	Constructed	OR	112	19.60
Pysht River	Nominated	OR	112	24.60
Klickitat (Lower Bank Site)	Monitor	SWR	142	7.00
Skookum Canyon Creek	Scoped	SWR	142	14.80
Wahkiakus Bridge	Scoped	SWR	142	16.33
Klickitat River at SR 142, MP 14.8 –	Assessed	SWR	142	16.90

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<b>Project</b>	<b>Status</b>	<b>Region</b>	<b>State Route</b>	<b>MP</b>
19.0				
Little Klickitat Confluence	Nominated	SWR	142	19.00
Methow River	Nominated	NCR	153	4.59
Little Bear Creek Bridge	Assessed	NWR	202	0.14
Snoqualmie River, Preston-Falls City	Constructed	NWR	202	21.80
Mud Creek	Monitor	NWR	202	23.50
Snoqualmie River Sinnema-Quaale Site	Under Analysis	NWR	203	11.05
Coe Clemmons Creek	Funded	NWR	203	14.55
Peoples Creek	Nominated	NWR	203	19.52
Nason Creek	Nominated	NCR	207	0.50
Yakima River (Van Giesen Road)	Constructed	SCR	224	7.90
Spring Creek	Nominated	ER	231	37.00
Union River Bridge	Assessed	OR	300	2.00
Sand Hill Road	Scoped	OR	300	2.00
Victor Flood Issue	Nominated	OR	302	4.18
Dogfish Creek	Nominated	OR	307	0.05
Forbes Creek	Under Analysis	NWR	405	19.12
Clay Creek	Assessed	NWR	410	35.76
Old Hancock Bridge (AKA Twin Creeks)	Assessed	NWR	410	38.00
White River (Federation Forest)	Assessed	NWR	410	41.40
White River (Skookum Falls View-point)	Assessed	NWR	410	51.60
White River (High Bank)	Assessed	NWR	410	54.90
American River (Hells Crossing)	Concurred	SCR	410	83.50
American River (Hells Crossing site #2)	Ongoing CED	SCR	410	84.00
Rock Creek	Ongoing CED	SCR	410	102.30
Rattlesnake Creek	Constructed	SCR	410	107.50
Chelatchie Creek Tributary	Nominated	SWR	503	24.65
Marble Creek	Nominated	SWR	503	42.93
Houghton Creek	Ongoing CED	SWR	503	47.80
Kenyon Creek	Nominated	SWR	503	49.03
Toutle River	Constructed	SWR	504	16.00
Wooster Creek	Ongoing CED	SWR	504	17.00
Newaukum River (site #3) (Guerrier	Funded	SWR	508	3.15

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<b>Project</b>	<b>Status</b>	<b>Region</b>	<b>State Route</b>	<b>MP</b>
Rd)				
Newaukum River (site #2)	Re-opened	SWR	508	5.80
Newaukum River (site #1)	Constructed	SWR	508	7.00
No Name Creek (Tilton Trib)	Monitor	SWR	508	24.30
Tilton River (site #1) @ Morton	Under Anal- ysis	SWR	508	29.00
Union and Steamboat Sloughs	Assessed	NWR	529	5.35
Stillaguamish	Under Anal- ysis	NWR	530	21.81
Sauk River (confluence)	Constructed	NWR	530	56.00
Sauk River Confluence Follow-up	Re-opened	NWR	530	56.00
Sauk River (cribwall)	Constructed	NWR	530	58.45
Sauk River (realignment)	Constructed	NWR	530	59.20
Skagit River Bridge	Ongoing CED	NWR	530	67.34
Anderson Creek	Funded	NWR	542	6.50
NF Nooksack River, revetment	Constructed	NWR	542	20.50
NF Nooksack River, washout	Constructed	NWR	542	26.70
NF Nooksack River, Devine Proper- ty	Nominated	NWR	542	27.00
NF Nooksack River (Site No. 3)	Nominated	NWR	542	27.06
NF Nooksack River (Site No. 4) Ber- ry Stand	Nominated	NWR	542	27.17
NF Nooksack River, Bruces Creek	Constructed	NWR	542	28.00
NF Nooksack River (Site No. 6) Boulder Creek Bridge	Constructed	NWR	542	28.34
NF Nooksack River, Warnick Bluff	Constructed	NWR	542	30.00
NF Nooksack River (Site No. 12) Cornell Creek Road	Nominated	NWR	542	30.50
NF Nooksack River (Site No. 10) Warnick Bridge	Ongoing CED	NWR	542	30.87
NF Nooksack River (Site No. 9) Canyon Creek Levee	Nominated	NWR	542	30.89
NF Nooksack River (Site No. 7) Gal- lup Bridge	Constructed	NWR	542	33.41
NF Nooksack River (Site No. 8) Glacier Creek Bridge	Scoped	NWR	542	33.50
NF Nooksack R (Site No. 8a) Glacier Cr Side Channel	Ongoing CED	NWR	542	33.60
NF Nooksack River, powerline	Constructed	NWR	542	37.20
NF Nooksack River, upper powerline - chainup	Nominated	NWR	542	37.68

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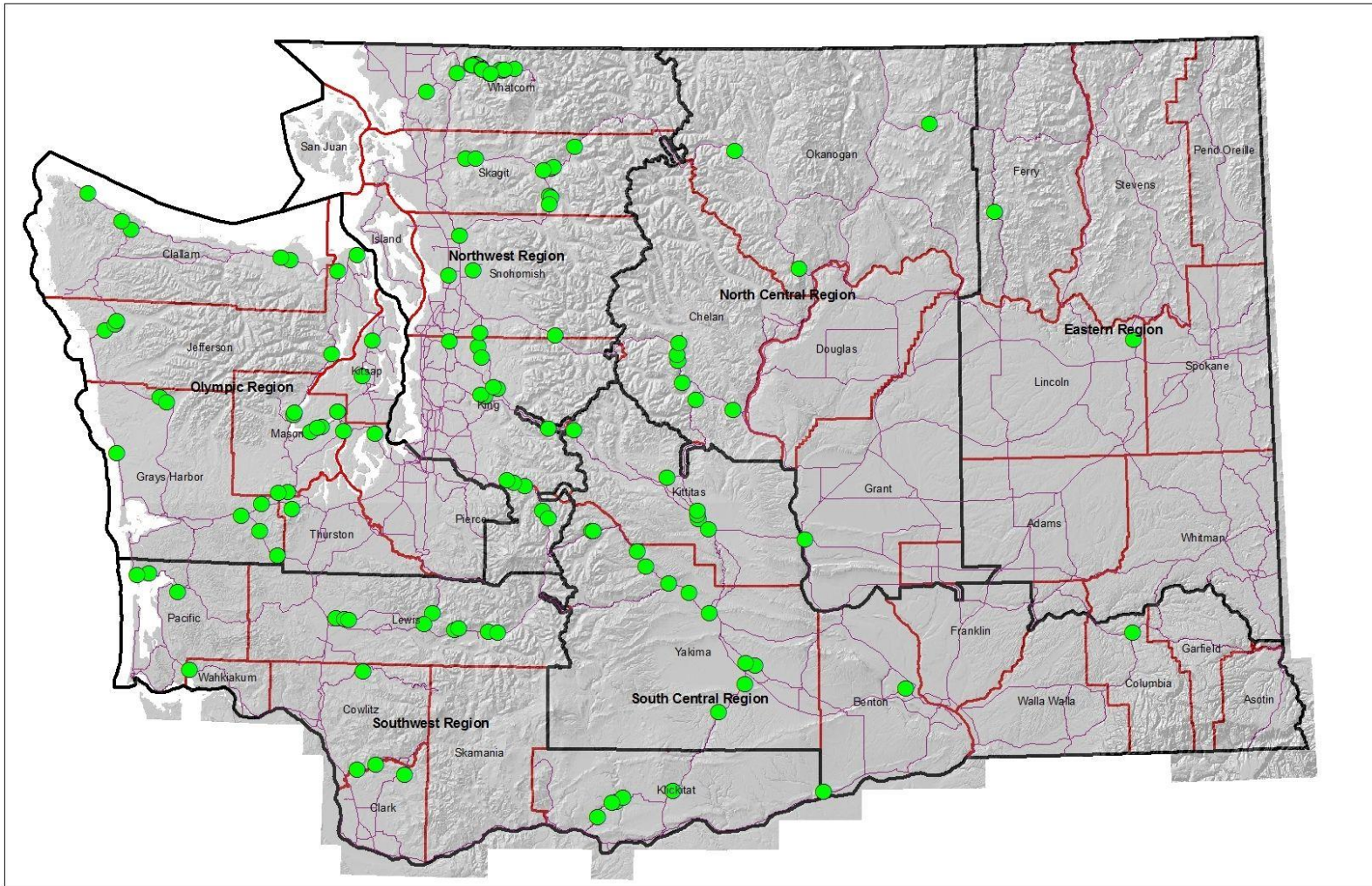
<b>Project</b>	<b>Status</b>	<b>Region</b>	<b>State Route</b>	<b>MP</b>
NF Nooksack River, Church Mt. Rd	Constructed	NWR	542	38.00
NF Nooksack River (Site No. 15) Fossil Creek Bridge	Nominated	NWR	542	38.50
NF Nooksack River (Site No. 17)	Nominated	NWR	542	41.90
Teanaway River	Ongoing CED	SCR	970	5.50

**Table 3. Key to status codes.**

<b>Status</b>	<b>Explanation</b>
Nominated	Nominated, not analyzed yet
Under Analysis	Analysis is underway which will result in a Reach Assessment or similar document.
Assessed	A reach assessment has been completed but currently no project is being proposed. Review by regional and headquarters staff continues.
Monitor	A reach assessment has been completed, but the recommended action is to watch the site for further developments and continue to maintain the site.
Ongoing CED	A project has been proposed, and regional and headquarters staff continue to work toward eventual concurrence, design, and construction.
Concurred	WSDOT and WDFW have reached concurrence.
Scoped	A project has been scoped, but no funding identified.
Funded	Funding for a project is identified in capital planning documents.
Constructed	Constructed using CED funds and/or any other funding source.
Re-opened	Site or project conditions have changed and reanalysis leading to a revised reach assessment or other technical document has been started. This may occur at any point in the process.



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**Figure 2. Statewide distribution of CED projects and WSDOT Regions.**

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### **FY 2015 Activities**

#### *New Sites*

Several new locations have been added to the list of CED-nominated sites this year. These include:

- SR 2, MP 46, Skykomish River, Northwest Region. The river is rapidly eroding through private property toward the highway.
- SR 18 MP 8.9, Soosette Creek, Northwest Region. Failed grade control structures are leading to degraded channel beneath a bridge.
- SR 20 MP 184.25, Goat Creek Springs, North Central Region. Locally-initiated restoration of a side channel could impact undersized culverts.
- SR101 MP 174, Hoh 1 Follow-up, Olympic Region. Area between engineered log jams on the Hoh 1 CED site are eroding due to changes in channel morphology.
- US101 MP 320 to 333, Hood Canal Beach Nourishment, Olympic Region. Project inspired by successful Lower Hood Canal project on SR 106 to use landslide material for beach nourishment.
- SR 405 MP 19.12, Forbes Creek, Northwest Region. Erosion is occurring around concrete weirs below a new culvert.

#### *Concurrence*

The project located at SR 504 MP 17, Wooster Creek, in the South West Region went through the concurrence process this fiscal year. The concurrence called for an open-bottomed 19-foot culvert with a design allowing the stream to regrade naturally.

#### *Construction*

Three CED projects were constructed during the fiscal year. The completed projects were:

- The “Hoh 2” project (SR101 MP 175.8) was completed in the summer of 2014. This project built a log cribwall reinforced with steel pilings. An innovative system of gravel-filled sacks isolated the worksite without need for sheet-piles or other more invasive means of diverting flow. For more information, see the section on this project in “Highlighted Projects,” below.
- The Cowlitz River project, SR 12 MP 118.3 was designed and built quickly when it became apparent that SR 12 was in imminent danger. For more information, see the section on this project in “Highlighted Projects,” below.
- The Warnick Bluff project is located at a spot where SR 542 runs along the top of an unconsolidated 80-foot cliff (see Figure 3). A realignment of a section of highway moved the road about 200 feet back from the edge of the bluff. While this is not necessarily a permanent fix, the relatively slow retreat of the bluff should allow this to function as a relatively long-term fix (see Figure 4).

In addition, construction of three projects was about to begin at the end of the FY. The SR 203 Coe-Clemons Creek CED and the SR 542 Anderson Creek Culvert project are both culvert replacement projects. The Toutle River project (SR505 MP 16) is designed to provide geotechnical stabilization of the upper slope, and installation of habitat ele-



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ments upstream and downstream of an emergency repair, to improve habitat conditions and the transition to the emergency armor.



**Figure 3. Warnick Bluff before road relocation.**



**Figure 4. Warnick Bluff, showing replanted area where road was before relocation. The new road is located well to the right of this photo.**

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### Highlighted Projects

#### *SR 20, MP 100.7, Skagit River.*

The **Skagit River (SR 20 MP 100.7) dolo-timber project** has continued to get attention from the press and the travelling public. Through the summer tourist season, there was almost always someone stopped to check it out. The project seems to be working as planned, although at least one of the dolos has shifted position. Maintenance staff will determine the best way to address the misplaced dolo (see Figure 5).



**Figure 5. Air photo of part of the Skagit River dolo-timber project showing dolo that has moved (near center of picture, off the point).**

#### *SR 101, MP 175.8, Hoh River Site 2.*

The **Hoh River Site 2 project** was completed this fiscal year, in the summer of 2014. This site, a major erosion site along a high-energy reach of the Hoh River, is only a mile from the well-known Hoh 1 site. Erosion on a bend in the Hoh River had caused numerous incidents of maintenance and a project was developed to address the problem with a log cribwall between the road and the river (see Figures 6 and 7 and this document's cover). The construction went very smoothly. An innovative system of gravel-filled sacks was used to isolate the worksite (without need for sheet-piles or other more invasive means of diverting flow) and was combined with a temporary access structure so that the project could be built without placing equipment in the river. The completed project seems to be working exactly as planned, and has already been subjected to some high flows without complications.

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**Figure 6. Hoh 2 project under construction showing isolation structure and temporary access structure.**



**Figure 7. Completed Hoh 2 project.**



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### *SR 12, MP 118, Cowlitz River.*

The **Cowlitz River** site continued to erode rapidly toward the highway (see Figure 8) even in relatively minor periods of high water. The top of the eroded bank reached the right-of-way fence by spring of 2015 and an accelerated design and construction effort allowed WSDOT to complete the project in the summer of 2015. The project was a simple rock revetment with a series of log structures to provide habitat and structural reinforcement (see Figure 9). Behind the structure there are flood fences and riparian plantings.

Water levels in two closely-spaced storms in the fall of 2015 overtopped the structure (water reached the highway surface) and did minor damage to parts of it. Considering the incredible rate of erosion that had occurred in recent years with much smaller storms, it seems likely that there would have been major damage to the road without the new protection offered by the rock and wood structure. The damage does not appear to be enough to threaten the road, and maintenance staff plan to make repairs in the summer low-water season.



**Figure 8. Cowlitz River Site, US 12, 2014 (left) and 2015 (right). About 20 feet has eroded and the river had reached the right-of-way fence.**

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**Figure 9. Cowlitz River Site, US 12, detail of completed project, October 2015.**

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